Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

.932
2Ag8
o.107
eserve

ACE.107

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
and
Bureau of Agricultural Chemistry and Engineering

LIBRARY
RECEIVED
★ JUL 24 1943 ★
U. S. Department of Agriculture

# PREVENTING GIN DAMAGE TO COTTON IN GEORGIA

By Francis L. Gerdes, Senior Cotton Technologist
Agricultural Marketing Service
and
Charles A. Bennett, Senior Mechanical Engineer,
Bureau of Agricultural Chemistry and Engineering

Paper presented by the senior author before a meeting of the Georgia Cotton Ginners' Association, Atlanta, Ga., June 25, 1941

## INTRODUCTION

We, at the U. S. Cotton Ginning Laboratory, have for a long time been following with interest the cooperative efforts of Georgia cotton ginners, merchants, manufacturers, and extension workers to promote better ginning in your State. Especially have we been impressed with the way in which you have recently intensified your cooperative efforts by launching a comprehensive educational program with the full approval and cooperation of all interested parties. We feel that, although some progress has been made during recent years in the modernization of cotton ginning facilities in Georgia and in other Southeastern States, there is still room for considerable improvement.

Cotton harvesting and handling practices are not as good as they used to be. We all recognize the need for more care in these important operations. We also recognize the fact that, although good present-day gin machinery, if properly operated, can do a good job of conditioning and cleaning, it cannot completely restore the original quality to cotton that has been harvested carelessly or taken directly to the gin in a wet condition, especially the longer staple varieties of cotton now being widely grown.

## NATURE OF GIN DAMAGE

Although ginning or sample preparation--one of the three factors in grading--is the principal quality element affected by ginning, the leaf content of the ginned product can also be influenced by the preparatory processes of ginning. Little or nothing can be done, of course, in the way of ginning to affect the actual fiber color of lint. Sometime soil spots and boll-weevil damage can be broken up to an advantage by extracting machinery. Staple length is seldom influenced in the ginning process. The only ginning operations found to affect fiber length are: (1) those which increase gin turnout materially beyond that of standard ginning, and (2) overdrying of cotton at the gin or ginning of cotton of subnormal moisture content. Staple length is

sometimes penalized because the sample is of very rough preparation or is "nappy." But a sample must be badly gin-cut and reduced about three grades, or ginned from extremely wet cotton, before the fibers are actually cut.

Most of you are familiar with the factors that make up grade, and which are a measure of ginning quality. Nevertheless, it is believed that it would be of interest at this point to dwell for a moment on a breakdown of some of these elements.

The grade of cotton reflects to a considerable extent the amount and type of waste that will be removed during the manufacturing processes, and it also may play an important part in determining the types of goods that may be manufactured from it. Naturally, if the cotton is leafy or is of poor preparation, it will yield larger quantities of manufacturing waste in the spinning processes, and cause the finished product to contain more imperfections and to give more seconds than would otherwise be the case.

"Naps," or the large tangles of fibers, caused by ginning cotton with an excess of moisture or with dense seed rolls, influence preparation and increase the waste that must be removed during cotton manufacturing. Motes also constitute mill waste.

"Neps," which are small tangles of fibers that are nearly always associated with so-called immature or thin-walled fibers, are considered in designating preparation of a sample of cotton. Although neps are extremely small, frequently of almost microscopic dimensions, they can be detected rather easily and quickly by the unaided eye in classers' staple pulls. No saw-ginning process has yet been discovered for the prevention of neps in cottons having fiber qualities that make them susceptible to nepping. Many of the neps produced in ginning are carried through the manufacturing processes, along with others that are formed during the processing, to make the yarn neppy and undesirable from the standpoint of appearance, evenness, dyeing, and other properties.

## AN APPRAISAL OF GRADE LOSSES

During the 8-year period ending 1940, an annual average of about 9-1/2 percent, or more than 100,000 bales of Georgia cotton, was ginned rough and reduced one grade or more in value on account of poor preparation, according to data released by the Agricultural Marketing Service. In addition to these reported reductions of one grade or more in quality, a considerable part of the crop each year may be placed in the category of normal preparation that yet may be ginned slightly but sometime noticeably rough, although it may not be damaged enough to be reduced a full grade. Numerous other value discounts are associated with staple-length penalties made on extremely rough-ginned cotton and with lint of a dull color or trashy condition. These qualities that bring penalties are the result of cotton having been ginned in a wet condition, or of having been roughly and carelessly harvested by methods frequently employed by producers in an effort to harvest their cotton as quickly as possible.

Figures on the extent of the total or aggregate damage to cotton quality by poor ginning are not available, but the observations of those closely associated with the cotton industry in your State indicate that the total of the value penalties resulting from all causes is a very significant toll which is ultimately borne by cotton producers. Although it is impossible to make an accurate estimate of the annual money losses which cotton producers are bearing as a result of poor ginning, it appears more than probable that, during the 8-year period mentioned, the economic losses in Georgia amounted to several hundred thousand dollars a year.

A further analysis of the data relative to cotton preparation during the period 1937-40 for Georgia revealed that, as compared with the years 1933-36, the preparation was, on the average, consistently better. Beginning with the 1937 crop and extending through the 1940 crop the rough preparation averaged about 7-1/2 percent as compared with an average of 11-1/2 percent during the previous 4-year period. In 1940, the proportion of rough cotton was 9 percent or slightly higher than the average for the 4-year period ended 1940 because of more adverse weather conditions during the 1940 harvesting season than those which prevailed during some of the previous seasons of this period.

## GEORGIA COTTON GINNING AND RELATED INFORMATION

During the 1940 season, the cotton acreage of Georgia represented about 8 percent of the entire acreage devoted to cotton production in the United States, and it produced about 1 million bales of cotton, or 8 percent of the United States cotton crop. Almost 8 percent of the cotton of the 1940 crop of the United States that graded Middling and better was composed of Georgia cotton, but only 5 percent of the cotton of 1-1/32 inches and longer was from this State. It has been estimated that almost 900,000 bales of the total 1940 crop was reduced at least a full grade in quality because of rough ginning preparation, and that more than 90,000 of these bales, or 10 percent, were Georgia cotton. As compared with the United States crop, the Georgia crop was a little better in yield per acre, about normal in grade, slightly shorter in staple length, and a little lower in preparation. Although the State ginned 8 percent of the crop of the United States, it had more than 11 percent of the gins. Their ginnings per gin averaged only slightly more than 800 bales as compared with an average of almost 1,100 bales per ginning establishment in the United States.

The gin plants in Georgia not only have a much lower average volume of ginning than the gins in the United States as a whole, but they, like those of some of the other Southeastern States, have fewer gin stands per plant than gins in other areas.

Compared with the gins in the Mississippi Valley States, the gins in the Southeastern States are older and in poorer state of repair, and, as a consequence, more of them operate with dense seed rolls which cause rough ginning preparation. Of the 155 fairly representative southeastern gins

surveyed in 1940 by the laboratory of the U. S. Department of Agriculture at Stoneville, Miss., over one-third were found to be operating with saws in fair to poor condition as compared with one-fourth of those examined in the Mississippi Valley States.

The proportion of southeastern gins found with saws worn down more than 1/16 inch from wear and sharpenings was higher by 5 percent than that of the gins surveyed in the Mississippi Valley States. Almost one-half of the southeastern gins checked by the laboratory were operating with dense seed rolls, while one-third of the gins in the other area were so operated. The gins in the latter area were found to be employing higher gin-saw speed than those in the Southeast, or speeds higher by an average of about 30 revolutions per minute.

## COMMERCIAL GIN OPERATING PRACTICES INFLUENCING GINNING QUALITY

In connection with some of the gin operating practices that have a marked influence on the quality of ginning, it should be of interest at this point to examine the results of field surveys made by the laboratory in commercial gins across the Cotton Belt during the 1940 ginning season, particularly the findings in regard to the influence of different gin-saw speeds, gin-saw conditions, and gin-saw diameter reductions on seed-roll density and ginning time.

With respect to saw speed observations, the surveys in about 500 commercial gins brought out the fact that loose seed rolls, which provide smoother ginning than dense seed rolls, were employed in about 87 percent of the gins operating with saw speeds above 650 revolutions per minute; in about two-thirds of those running with speeds of 551 to 650 revolutions per minute; in one-half of those with speeds of 451 to 550 revolutions per minute; and in only 42 percent of those with speeds of 450 revolutions per minute and below. These findings show a direct relationship between gin-saw speed and the proportion of gins operating with loose seed rolls. The ginning time ranged, on the average, from 63 minutes for the high-speed gins to 82 minutes per bale per gin stand for the low-speed gins. These observations are in line with findings made available through long-time laboratory tests of variations in gin-saw speed and seed-roll density.

It was also found that a direct relationship existed between seed-roll density and gin-saw condition and gin-saw diameter, as well as between ginning capacity and each of these two elements of the gin saws. Of the gins operating with saws in good condition, two-thirds employed loose seed rolls; of those operating with saws in fair condition, less than one-half used loose seed rolls; and of those operating with poor saws, only one-third ginned with loose seed rolls. The ginning time ranged, on the average, from about 1 hour per bale per gin stand in the gins having good saws to 1-1/2 hours for those operating with poor saws. Relationships for definite reductions in saw diameter to seed-roll density and ginning time were similar to those between gin-saw condition and these two elements of ginning. When classifying the

gins by definite intervals of saw-diameter reduction associated with wear and sharpening, the data revealed that with 12-inch diameter saws, the percentage of gins operating with loose seed rolls was 70 percent; with 11-15/16 inches, it was 57 percent; with 11-7/8 inches, it was 42 percent; and with 11-27/32 inches and below, only 30 percent. Ginning time per bale ranged from 65 minutes for gins with 12-inch saws to 80 minutes for gin stands having saws with diameters of 11-27/32 inches and below. All these field observations confirm laboratory data obtained with these various elements of ginning in controlled experiments at the U. S. Cotton Ginning Laboratory.

In the light of these practical field verifications of laboratory results relating to the effects of differences in gin-saw speed, condition, and diameter on ginning quality and efficiency, numerous Georgia ginners can make profitable changes in these elements of their gins. Some gin operators of slow-speed gins, as well as those of gins with saws in poor condition and badly worn, have already given attention to correcting these elements of ginning. They have reported outstanding results from the alterations made.

## GIN IMPROVEMENTS CONTRIBUTING TO THE PREVENTION OF GIN DAMAGE

More than the usual number of ginners in the Southeastern States are making gin improvements that are contributing to better preservation of lint quality, and are now taking an interest in getting their gins in good shape by placing new and modern units and even by installing new machinery throughout the plant in order to cope with the problems that they are encountering. During the 1940 season, extractor cleaner-feeders were installed in quite a number of Georgia gins. Cotton driers were installed in 27 gins, bringing the total Georgia drier-equipped gins up to 59.

Based on reports from 39 percent of the ginners operating cotton driers in Georgia in 1940, it is estimated that almost 40,000 bales were dried in these units when the cotton had been harvested in a green, damp, or wet condition, and over 30,000 bales were conditioned and cleaned when the cotton had been brought to the gin in a dry condition. According to these reports, an average of almost three-fourths of the cotton ginned by the drier-equipped gins in the State was passed through driers operated with heat, for conditioning and cleaning; and the remainder was passed through the units without heat, for cleaning. The reports also indicated that the drying and cleaning benefits in terms of bale value increases averaged more than $4 with green, damp, or wet cotton.

In this connection, the study brought out the fact that some drier operators employed drying air temperatures that were too high in relation to the moisture content of the cotton to adequately preserve the staple length. It has been found that the drying temperature with most driers should not exceed 160° F. for the usual run of green and damp cotton. A slightly higher temperature can be used with very wet cotton, but under no circumstances should it exceed 200° F. The artificial drying process is not designed to completely take care of wet cotton. High temperature "bakes" the cotton, weakens the fiber strength, and injures the spinning quality. More attention should be given this element of drier operation if satisfactory results are to be obtained.

Improved ginning quality in Georgia was provided by still further modernization of existing gins in addition to that provided by installation of cleaning, extracting, and drying equipment. Modernization embraces repair of gin stands and auxiliary equipment, replacement of important parts, speeding up saws of slow speed gins, etc. Our survey of 45 fairly representative gins in Georgia in 1940 revealed that new saws were installed in quite a number of the gins. Saws already in use in one out of ten of the gins were reconditioned. The saws of the gins checked were speeded up an average of more than 100 revolutions per minute to provide still smoother ginning. New ginning ribs were installed in a few gins. A large number of extractor cleaner-feeder installations were made in place of plain feeders.

To provide better ginning service, eight new gin installations were made in Georgia in 1940. A machinery inventory made by the laboratory of six of these new plants showed that two-thirds were equipped for artificially drying seed cotton. All the new gins were equipped with extractor cleaner-feeders for cleaning the cotton.

Along with the favorable effects of drying and cleaning machinery on the grade of the ginned product, good ginning in the new plants was associated with the high speed at which the gin saws were operated in an effort to provide loose seed rolls. The saw speeds of the new gins averaged about 670 revolutions per minute, or much higher than other representative gins surveyed in the State. All the new gins surveyed operated with loose seed rolls. Other features of the new gins with which ginning capacity, lint turnout, and quality improvements were associated are improved designs of gin-saw teeth and roll boxes. Better regulation and more precision in control of the rate of feeding the cotton to the gin stands are also in evidence in the modern gins.

## OBTAINING FURTHER IMPROVEMENTS IN GINNING

In the light of the above developments in Georgia, and the interest that is already being shown in improving ginning on the part of many ginners, you and others concerned in your State have selected a very opportune time for intensifying your efforts in connection with a better ginning campaign. The posters prepared by the Georgia Cotton Improvement Committee for display at the gins should be very effective in making cotton producers realize the importance of exercising more care in harvesting and handling cotton, and in making them understand that modern cotton ginning requirements for the longer staple varieties of cotton now extensively grown are more rigid than ever before. They should be willing to pay a fair price for good ginning service, and should be encouraged to seek a good job of ginning.

## CONCLUSION

Before closing, a few more points should be emphasized. Cotton merchants and others who buy cotton should pay prices and encourage the paying of prices that are commensurate with the quality bought, if they expect farmers to continue to grow good cotton and to harvest and handle it carefully

and insist upon the ginners doing a good job of ginning. When a lot of cotton offered for sale has one bale or several bales of rough cotton in it, the grower should be told about it, and of the discounts that are being made in the price, rather than offered an average price for the whole lot without calling his attention to the variation in the quality of the lot. Some buyers occasionally are not inclined to do this for the reason that they think the producer may not accept his comments in the right spirit, and may patronize the buyer who flatters the quality of his cotton.

Cotton producers should know the general limitations of gin machinery and should be made to understand that the condition in which cotton reaches the gin largely determines the quality obtainable. Merchants and ginners can render a real service in this connection. The Smith-Doxey classification now available to groups of producers organized to promote the improvement of their cotton has been very helpful to producers in bringing rough bales of cotton to their attention. Many of the producers report that this classification, whoch shows the ginning preparation, provides a basis for correcting the underlying faults in such cases.

A large percentage of Georgia producers can qualify for this service because there are so many one-variety cotton improvement groups already organized in a manner that they can obtain the service. In 1940, there were in Georgia 195 active one-variety communities with 386,600 acres in the adopted varieties producing 239,718 bales of cotton; and a total of 124 of these community groups, having 193,234 acres in cotton, qualified for the Smith-Doxey classification service 1/.

Representatives of your State Agricultural Extension Service who work with farmers in these one-variety cotton improvement organizations are present at your meeting today. These men, along with the agricultural engineer assigned to the gin extension program in your State, have been working with your cotton producers in an effort to improve cotton harvesting and handling methods and obtain better ginning in Georgia. They are always pleased to work with ginners on their problems and they already have made good progress in this work. They and we realize, however, that there is opportunity for making much more improvement through the cooperative efforts of all concerned in the cotton industry in Georgia.

---

1/ This information was supplied through the courtesy of C. A. McLendon, Senior Agronomist, and Regional Director, Cooperative One-Variety Cotton Improvement Project, U. S. Bureau of Plant Industry.